Assembly Instructions

English

Grundig SAT Systems

Head-End Digital Modulator

HDM 500 C

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1 Safety regulations

Caution

- Assembly, installation and servicing should be carried out by authorised electricians.
- Switch off the operating voltage of the system before beginning with assembly or service work or pull out the mains plug.
- Do not perform installation and service work during thunderstorms.
- Install the system so it will not be able to vibrate…
  - in a dust-free, dry environment
  - in such a manner that it is protected from moisture, fumes, splashing water and dampness
  - somewhere protected from direct sunlight
  - not within the immediate vicinity of heat sources
  - in an ambient temperature of -20 °C to +50 °C.
- Ensure that the head-end station is adequately ventilated.
  Do not cover the ventilation slots.
- Beware of short circuits
- No liability is accepted for any damage caused by faulty connections or inappropriate handling.
- Observe the relevant standards, regulations and guidelines on the installation and operation of antenna systems.
- Earth the SAT receiver in accordance with DIN EN 50083-1 / EN 60728-11 and VDE 0855 (earthed, equipotential bonding rail).
- **For further information please read the assembly instructions for the head-end station used.**

Take action to prevent static discharge when working on the device.

2 General information

2.1 Packing contents

1 cassette HDM 500 C
2 HF cables
1 CD (assembly instructions)
1 Brief assembly instructions

2.2 Meaning of the symbols used

Important note

—> General note

• Performing works

2.3 Technical data

The devices meet the following EU directives:
2006/95/EC, 2004/108/EC
The product fulfils the guidelines and standards for CE labelling.

HF input

Frequency range:	950 … 2150 MHz
Level range:	60 dBµV … 80 dBµV
Input norm:	QPSK
Symbol rate:	1 … 45 Msymb./s, SCPC/MCPC

HF output

Channels:	S21 … C69
Frequency range:	42.0 MHz … 860.0 MHz
Output level:	typ. 97 dBµV
Output impedance:	75 Ω

Connections

SAT inputs:	2 F sockets
HF output:	1 IEC socket
Connection strip (10-pin):	for supply voltages and control circuits
RS 232 socket:	serial interface for software update

2.4 Description

The twin transmodulator cassette is a QPSK-converter, which converts all stations modulated according to DVB-S standard and QPSK into two QAM-modulated cable signals. The cassette has two digital SAT IF inputs and an HF output. It is equipped with two channel strips ("**A**" and "**B**"). Each channel strip consists of a digital tuner, a digital signal preparation unit and a modulator.
The prepared input signals reach the HF output collector of the head-end station via the HF output socket. The common output level of the channel strips can be set at the output collector of the head-end station.
Two LEDs indicate if the respective channel strip is switched on (LED illuminates) or off, and also provide an indication of the signal quality based on their colour. Additionally the quality of the data stream received is displayed ("**CN...**").
The output symbol rate is fixed to a value of 6900 kSymb/s. If the symbol rate being transmitted exceeds this value change to a high-order modulation (e.g. from 64 QAM to 256 QAM).
When the head-end station is switched on, the two-line LC display shows the software version of the control unit.
To operate this cassette the software version of the control unit must be "**V 37**" or higher. You can find the current operating software for the control unit and the cassette, the software "**BE-Flash**" and the current assembly instructions on the website "***www.gss.tv***".
The cassette is designed for use in the following head-end stations:
- STC 1200
- STC 316
- STR 19-8

2.5 Software query

Control unit

If necessary, you can activate the indication of the software version of the control unit manually:

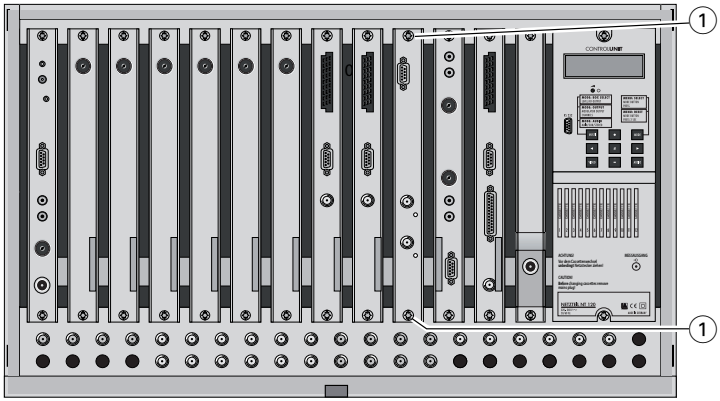
- Press any two keys on the control unit of the head-end station simultaneously until the display goes dark and the software version, e.g. "**V 37**" appears.

3 Assembly

3.1 Installing the cassette

– Ensure the head-end station is mounted so it will not be able to vibrate. Avoid, for example, mounting the head-end station onto a lift shaft or any other wall or floor construction that vibrates in a similar way.
– Before installing or changing a cassette unplug the power cable from the mains power socket.

- Remove the fastening screws (1) of an unoccupied slot from the bracket of the head-end station.
- Insert the cassette in this slot and push it into the housing.
- Align the cassette and apply slight pressure to connect it to the connections of the board and the HF bus bar.
- Fasten the cassette with the (1) screws.

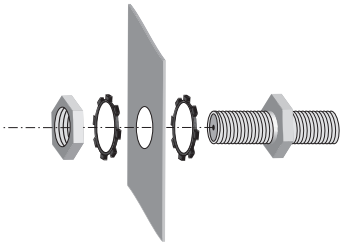


3.2 EMC regulations

To comply with the current EMC regulations, it is necessary to connect the lines leading in and out of the head-end station using F terminals.

The attenuation of shielding of the connection lines must meet the requirements for "Class A".

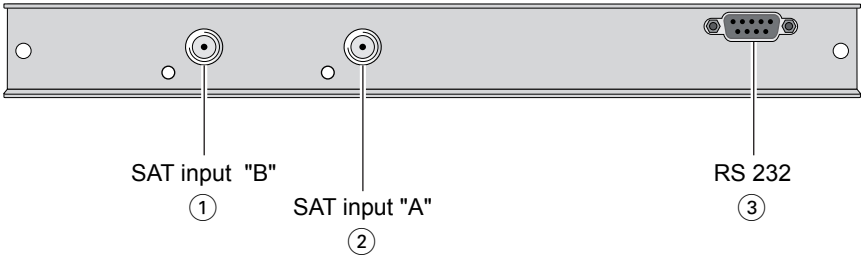
When mounting the cassette in a STR 19-8 head-end station which is installed in a 19" cabinet, make sure the connections leading in and out for the 19" cabinet are made using F terminals.



- Insert the required number of F terminals in the openings provided in the head-end station or in the 19" cabinet.
  —> F terminals are not included in the scope of delivery.

⚠ Tighten the nut on the F terminal until the teeth on the lock washer have penetrated the exterior coating and a good connection is made between the housing and F terminal.

3.3 Connecting the cassette



- Plug the SAT input cables into the SAT input sockets "**SAT input A**" ② (channel strip "A") and "**SAT input B**" ① (channel strip "B").
- Connect the head-end station to the mains power supply.

③ "**RS 232**" socket
The operating software of the cassette can be updated via the 9-Pin D-SUB socket "RS 232" using a PC or notebook and the software "**BE-Flash**".
You can find the current operating software on the website "***www.gss.tv***".

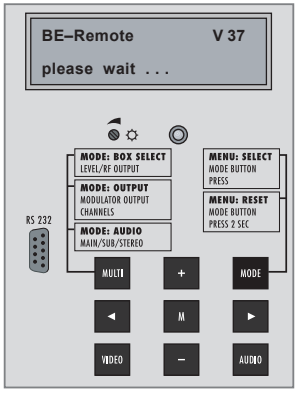
4 The control panel at a glance

4.1 Menu items

Program the cassette using the buttons on the control unit of the head-end station. The two-line display of the control unit then shows the menus.
The parameters and functions to be set are underlined.

Use the **MODE** key to select the following main menu items:

- Cassette
- Channel strip
- Channel / Frequency selection
- Output channel / output frequency
- Level setting
- LNB oscillator frequency
- Input symbol rate
- Input frequency
- QAM modulation
- Stuffing
- Substitute signal



4.2 Functions of the control panel buttons

The key pad on the head-end station is used to scroll through the menus and menu items one at a time:

MODE scrolls forward through the menus.

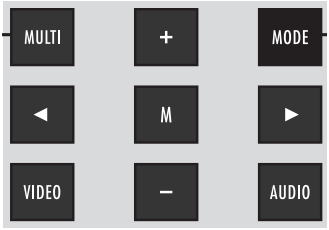
◄/► select parameters in the menus.

+/– set values, initiate actions.

MULTI selects sub-menus.

AUDIO scrolls backward through the menus.

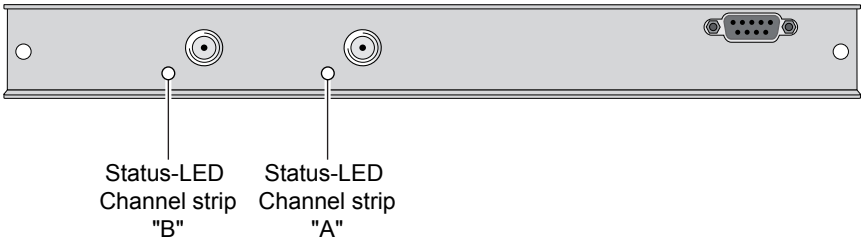
M saves entries.



5 Programming

5.1 Preparation

- Connect the test receiver to the HF output or the test output of the head-end station.
- Set the output channel / output frequency of the cassette (page 14 / 15) and adjust the TV test receiver to this channel / frequency.
- Switch on the channel strip (modulator) if necessary (s. page 15). For each channel strip, there is a status LED which indicates if the channel strip is switched on.



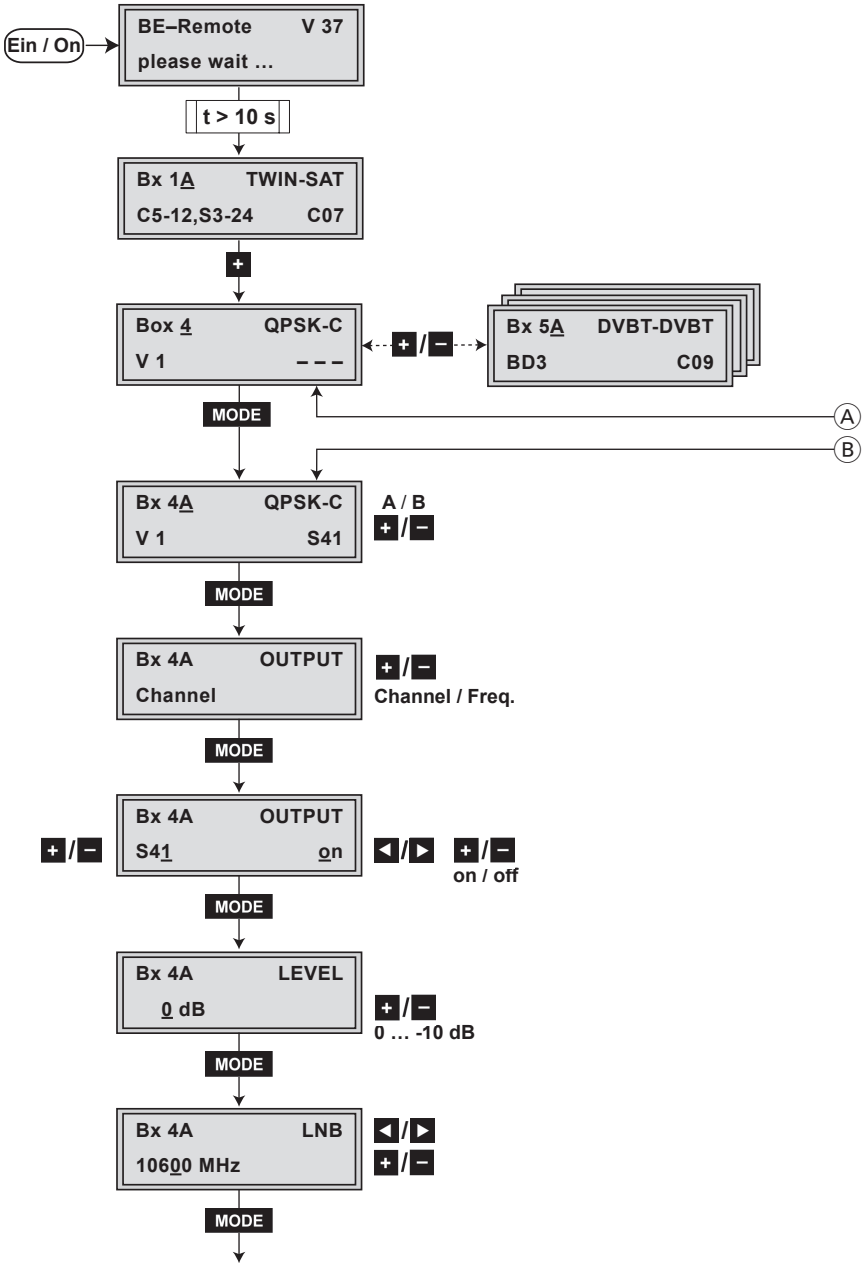
- Balance the output levels of the channel strips "**A**" and "**B**" if the difference in level is ≥ 1 dB (page 15).

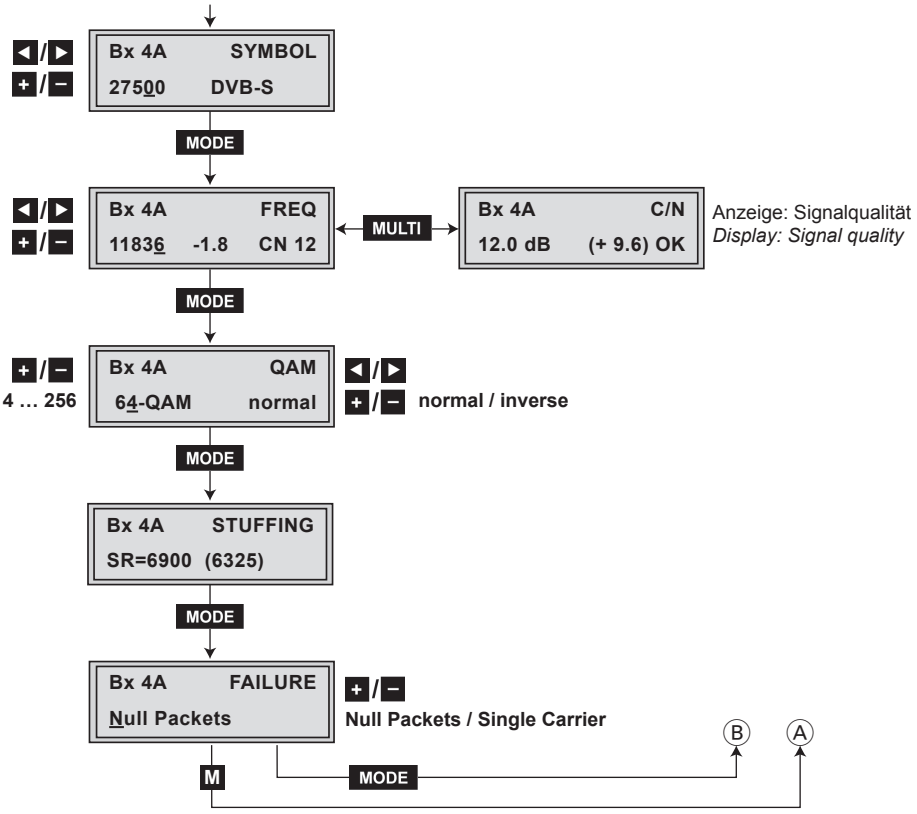
5.2 Notes on level setting

In order to prevent interference within the head-end station and the cable system, the output level of the QPSK-QAM module must be lowered by 10 dB compared to analogue modulators at 64 QAM, and by 4 dB compared to analogue modulators at 256 QAM.

- Measure the output levels of the other cassettes and tune them to a uniform output level using the appropriate level controls or software dependent on the head-end station used. Please regard the assembly instructions of the respective head-end station.

5.3 Programming procedure



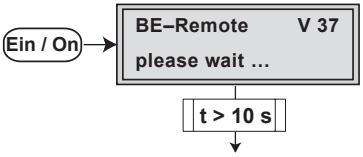

◀/▶
+/−
Bx 4A SYMBOL
27500 DVB-S
MODE
◀/▶
+/−
Bx 4A FREQ
11836 -1.8 CN 12
MULTI
Bx 4A C/N
12.0 dB (+ 9.6) OK
Anzeige: Signalqualität
Display: Signal quality
MODE
+/−
4 … 256
Bx 4A QAM
64-QAM normal
◀/▶
+/−
normal / inverse
MODE
Bx 4A STUFFING
SR=6900 (6325)
MODE
Bx 4A FAILURE
Null Packets
+/−
Null Packets / Single Carrier
M
MODE
B
A

5.4 Programming the cassette

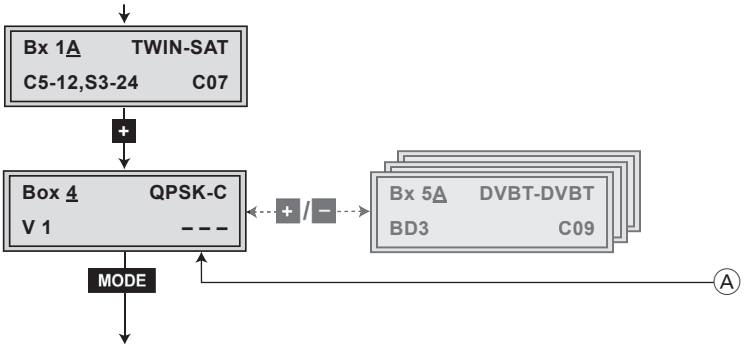
—> Pressing the **MODE** button for longer than 2 seconds cancels the programming procedure. This takes you back to the program item "Selecting the cassette" from any menu. Any entries that have not been saved are reset to the previous settings.

—> Entries in the menus can be saved by pressing the **M** key. You are taken back to the "Selecting the cassette" menu item.

- Switch on the head-end station
  —> The display shows the software version (e.g. V 37)
  —> The processor reads the cassettes' data (approx. 10 seconds).



Selecting the cassette



- Select the cassette you want to program (e.g. **Box 4**) by repeatedly pressing the button **+** if necessary.

- By pressing the **MODE** button, activate channel strip "**A**".

Selecting the channel strip

—> The display shows e.g. the menu "**Bx 4A QPSK-C**":
"**Bx**" stands for cassette (box),
"**4**" for slot 4
"**A**" for channel strip "**A**"
"**QPSK-C**" Type of cassette
"**S41**" Channel set

- By pressing **+ / –**, select channel strip "**A**" or "**B**".

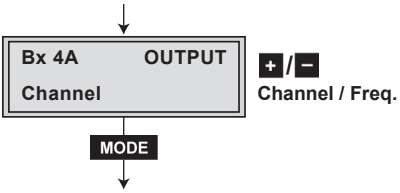
- Press the **MODE** button.
  —> The "Selecting channel / frequency setting" – "**OUTPUT**" menu is activated.

Selecting channel / frequency setting

In this menu, you can choose the channel or frequency setting for the adjustment of the HF output. The channel setting covers the range of channels S21 … C69, the frequency setting covers the range from 42.0 MHz to 860.0 MHz.

The QAM signal is normally transmitted with a bandwidth of 8 MHz. This means that you can only use the channel centre frequency of the existing channel raster in the range of channels S21 … C69 (frequency raster 8 MHz). The CCIR channel raster is 7 MHz in the range of the lower frequency bands (channels C2 … S20). Therefore the frequency setting is used here. If one uses the existing channel raster of 7 MHz in these channel ranges, this will result in interference (overlapping) with the 8 MHz QAM signal packages, thus causing transmission problems.

For programming in these channel ranges and in the frequency ranges below them, we recommend starting with channel S21 / 306 MHz going back in steps of 8 MHz.

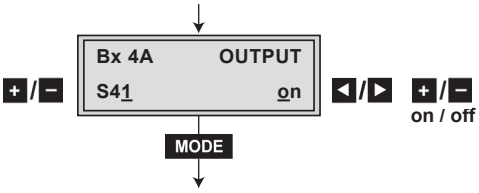


- Use **+/−** to select channel setting "**Channel**" or frequency setting "**Freq.**".

- Press the **MODE** button.
  —> The "Setting the output channel" or "Setting the output frequency" – "**OUTPUT**" menu is activated.
  —> If frequency setting is selected continue on page 15 with "Setting the output frequency".

Setting the output channel

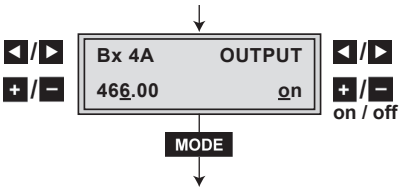
In this menu you set the output channel (S21 … C69) of the channel strip. Additionally the modulator of the channel strip can be switched off or on (page 15).



- Use the **+/−** buttons to set the output channel.

Setting the output frequency

In this menu you set the output frequency (42.0 … 860.0 MHz) of the channel strip. Additionally the modulator of the channel strip can be switched off or on.



- Use the ◀/▶ buttons to position the cursor under the digit of the frequency displayed to be set then use +/− to set the output frequency wished.

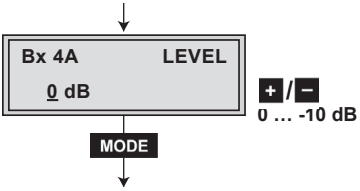
Switching the modulator off or on

- To switch off the modulator move the cursor under "**on**" using the ▶ button and then use the +/− buttons to switch off "**off**" the modulator.
  —> The switched off modulator is indicated by " - - - " in the display.
- If the modulator is switched "**off**" use the +/− buttons to switch it on "**on**".

- Press the **MODE** button.
  —> The "Adjusting the output levels of the channel strips" – "**Level**" menu is activated.

Adjusting the output levels of the channel strips

In this menu you can set the output levels of the modulators of the channel strips "**A**" and "**B**" to the same value.

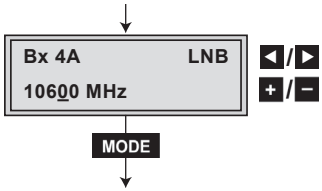


- Measure and note down the output level of the channel strip.
- Save the settings by pressing the **M** button.
- Select the other channel strip (page 13), measure and note down its output level.
- Activate the "**LEVEL**" menu of the channel strip with the higher output level.
- By pressing **+/–** adjust the higher output level of one channel strip to the lower output level of the other channel strip incrementally from "**0**" to "**–10 dB**".

- Press the **MODE** button.
  —> The "Setting the LNB oscillator frequency" – "**LNB**" menu is activated.

Setting the LNB oscillator frequency

Set the oscillator frequency of the LNB used in this menu.

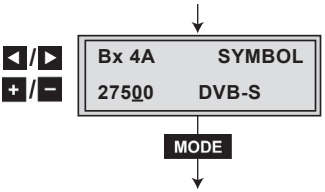


- Use **◀/▶** to position the cursor under the digit to be set for the frequency display.
- Press **+/–** to enter the oscillator frequency of the LNB used.

- Press the **MODE** button.
  —> The "Setting the input symbol rate" – "**SYMBOL**" menu is activated.

Setting the input symbol rate

The symbol rates of the satellite transponders can be found in the current channel table of the satellite operator, in various satellite magazines and in the Internet.



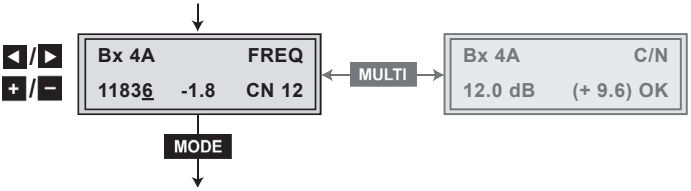
- Use ◀/▶ to position the cursor under the digit to be set for the symbol rate displayed.
- Press +/− to enter the values of the symbol rate.

  —> The "**DVB-S**" logo has no function.

- Press the **MODE** button.
  —> The "Setting the input frequency" – "**FREQ**" menu is activated.

Setting the input frequency

If three dots " **...** " appear in the second line of the display, the cassette is in the "**station search**" mode. Please wait until the process has finished.
Once the HF receiver has synchronised to the input signal, any offset to the target frequency is displayed in MHz, e.g. "**– 1.8**".
If a question mark "**?**" appears in the second line of the display, there is no input signal present. Check the configuration of the antenna system and head-end station as well as the preceding settings of the cassette.

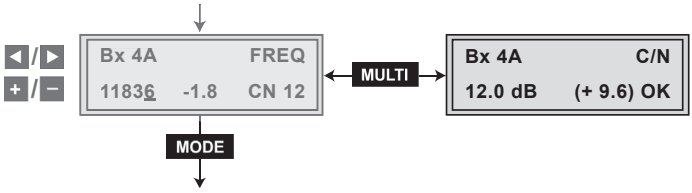


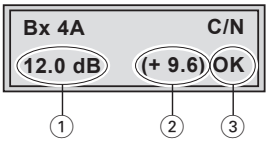
- Use ◀/▶ to position the cursor under the digit of the frequency displayed to be set.
- Press + / − to set the input frequency.
- Set the frequency offset shown in the display to less than 1 MHz by varying the input frequency using the + / − buttons.

- Press the **MULTI** button.
  —> The "Testing the signal to noise ratio" – "**C/N**" menu is activated.

Testing the signal to noise ratio

In this menu you can estimate the quality of the input signal.



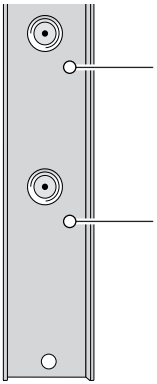


① Current signal to noise ratio

② This value shows the difference between the quality of the input signal and the threshold of the tuner at this type of modulation.
At a value lower than "**5**" picture dropouts can occur.

③ If "**OK**" is shown, the signal to noise ratio is ok.
If a value < 5 is shown under ② the display changes from "**OK**" to "**??**". In this case test the input signal.

—> In addition to the indicator in the display, there is also a status LED which indicates the quality of the received transport stream:



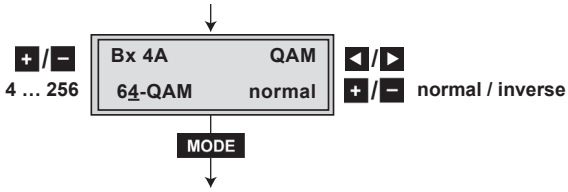
LED indicator	Indication
Green	Signal quality is good
Yellow	Signal quality is poor
Red	No signal
Off	The channel strip (modulator) is switched off

- Press the **MULTI** button to return to the main menu.

- Press the **MODE** button.
  —> The "Setting the QAM modulation" – "**QAM**" menu is activated.

Setting the QAM modulation

In this menu, you can set the QAM modulation and invert the user signal. For the setting of 256 QAM the output level is increased automatically.



- Use **+/−** to set the QAM modulation ("**4-QAM**" … "**256-QAM**").
  —> For higher QAM modulation, the output symbol rate is lowered.
  An output QAM modulation of > 64 QAM places a large burden on the cable network. Due to noise, delay and frequency response problems, reception of the converted output signal can be impeded.

Inverting the user signal

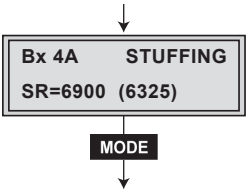
For exceptional cases and "older" digital cable receivers, the spectral position of the user signal can be inverted "**inverse**".

- Use ◀/▶ to position the cursor under "**normal**".
- Use +/− to set the spectral position to "**inverse**".

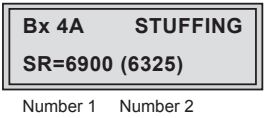
- Press the **MODE** button.
  —> The "Testing stuffing" – "**STUFFING**" menu is activated.

Testing stuffing

The output symbol rate is fixed to a value of 6900 kSymb/s. If the symbol rate being transmitted exceeds this value change to a high-order modulation (e.g. from 64 QAM to 256 QAM).



SR=6900 (= "number 1"): Output symbol rate



(**6325**) (= "number 2"): Current measured output symbol rate. The value will fluctuate, as the data rates for individual stations are dynamically altered by the broadcasters.

—> The value of "number 2" must not be higher than that of "number 1". If the value of "number 2" is higher than that of "number 1" , question marks "**??**" will appear in the display.

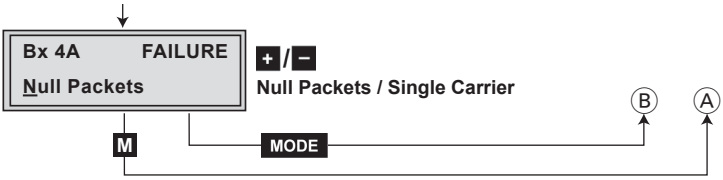
Bx 4A	STUFFING
SR=6900	(6950) ??

- In this case you can return to the "Setting the QAM modulation" menu using the **AUDIO** button and increase the QAM modulation.

- Press the **MODE** button.
  —> The "Setting a substitute signal in the case of an incorrect input signal" – "**FAILURE**" menu is activated.

Setting a substitute signal in the case of an incorrect input signal

You use this menu to set whether a "**Null Packets**" QAM signal or a "**Single Carrier**" signal should be provided as an output signal whenever an incorrect input signal occurs.



- Use the **+/–** buttons to set the output signal required.

Saving settings

- Press the **M** button.
  —> Going back to "Selecting the cassette" (A) (page 12).
  —> The settings are saved.

  —> By pressing the **MODE** button, you will be returned to the menu item "Selecting the channel strip" via (B) **without** saving the programmed data (page 13).

6 Channel and frequency tables

CCIR – Band I/III (Frequency raster 7 MHz)

Kanal Channel	Bildträgerfrequenz Picture carrier frequency [MHz]	Kanal Channel	Bildträgerfrequenz Picture carrier frequency [MHz]	Kanal Channel	Bildträgerfrequenz Picture carrier frequency [MHz]	Kanal Channel	Bildträgerfrequenz Picture carrier frequency [MHz]	Kanal Channel	Bildträgerfrequenz Picture carrier frequency [MHz]
C 2	48.25	S 5	133.25	C 5	175.25	C 11	217.25	S 15	259.25
C 3	55.25	S 6	140.25	C 6	182.25	C 12	224.25	S 16	266.25
C 4	62.25	S 7	147.25	C 7	189.25	S 11	231.25	S 17	273.25
S 2	112.25	S 8	154.25	C 8	196.25	S 12	238.25	S 18	280.25
S 3	119.25	S 9	161.25	C 9	203.25	S 13	245.25	S 19	287.25
S 4	126.25	S 10	168.25	C 10	210.25	S 14	252.25	S 20	294.25

CCIR – Hyperband (Frequency raster 8 MHz)

Kanal Channel	Bildträgerfrequenz Picture carrier frequency [MHz]	Kanalmittenfrequenz Channel centre frequency [MHz]	Kanal Channel	Bildträgerfrequenz Picture carrier frequency [MHz]	Kanalmittenfrequenz Channel centre frequency [MHz]	Kanal Channel	Bildträgerfrequenz Picture carrier frequency [MHz]	Kanalmittenfrequenz Channel centre frequency [MHz]	Kanal Channel	Bildträgerfrequenz Picture carrier frequency [MHz]	Kanalmittenfrequenz Channel centre frequency [MHz]
S 21	303.25	306.00	S 27	351.25	354.00	S 33	399.25	402.00	S 39	447.25	450.00
S 22	311.25	314.00	S 28	359.25	362.00	S 34	407.25	410.00	S 40	455.25	458.00
S 23	319.25	322.00	S 29	367.25	370.00	S 35	415.25	418.00	S 41	463.25	466.00
S 24	327.25	330.00	S 30	375.25	378.00	S 36	423.25	426.00			
S 25	335.25	338.00	S 31	383.25	386.00	S 37	431.25	434.00			
S 26	343.25	346.00	S 32	391.25	394.00	S 38	439.25	442.00			

CCIR – Band IV/V (Frequency raster 8 MHz)

C 21	471.25	474.00	C 35	583.25	586.00	C 49	695.25	698.00	C 63	807.25	810.00
C 22	479.25	482.00	C 36	591.25	594.00	C 50	703.25	706.00	C 64	815.25	818.00
C 23	487.25	490.00	C 37	599.25	602.00	C 51	711.25	714.00	C 65	823.25	826.00
C 24	495.25	498.00	C 38	607.25	610.00	C 52	719.25	722.00	C 66	831.25	834.00
C 25	503.25	506.00	C 39	615.25	618.00	C 53	727.25	730.00	C 67	839.25	842.00
C 26	511.25	514.00	C 40	623.25	626.00	C 54	735.25	738.00	C 68	847.25	850.00
C 27	519.25	522.00	C 41	631.25	634.00	C 55	743.25	746.00	C 69	855.25	858.00
C 28	527.25	530.00	C 42	639.25	642.00	C 56	751.25	754.00			
C 29	535.25	538.00	C 43	647.25	650.00	C 57	759.25	762.00			
C 30	543.25	546.00	C 44	655.25	658.00	C 58	767.25	770.00			
C 31	551.25	554.00	C 45	663.25	666.00	C 59	775.25	778.00			
C 32	559.25	562.00	C 46	671.25	674.00	C 60	783.25	786.00			
C 33	567.25	570.00	C 47	679.25	682.00	C 61	791.25	794.00			
C 34	575.25	578.00	C 48	687.25	690.00	C 62	799.25	802.00			